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PATENT, TRADEMARK, COPYRIGHT
AND UNFAIR COMPETITION LAW
AND RELATED LITIGATION

January 7, 2005

FACSIMILE COVER SHEET

To: U.S. Patent and Trademark Office
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Enclosures:

- Fax Cover Sheet containing Certificate of Facsimile Transmission (1 page)
- Transmittal containing Certificate of Facsimile Transmission with authorization to charge Deposit Account 23-3000 in the amount of $950.00 (including $500.00 for the Filing Fee and $450.00 for Two-Month Extension of Time Fees (2 pages)
- Appeal Brief (23 pages, including cover sheet, 15 pages Appeal Brief and 7 pages Claims Appendix)

From: Scott A. Stinebruner
Reg. No. 38,323

Re: U.S. Patent Application

Serial No.	09/694,586
Filed:	October 23, 2000
Applicant:	Timothy Roy Block et al.
Art Unit:	2155
Confirmation No.:	8940
Our Ref:	IBM/167

Pages: 26 (including cover sheet)

MESSAGE/COMMENTS
OFFICIAL

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Judith L. Volk — Judith L. Volk

January 7, 2005 — Date

PATENT

Attorney Docket No. IBM/167
Confirmation No. 8940

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Judith L. Volk — January 7, 2005

Judith L. Volk — Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Timothy Roy Block et al.	Art Unit:	2155
Serial No.:	09/694,586	Examiner:	Benjamin R. Bruckart
Filed:	October 23, 2000	Atty. Docket No.:	IBM/167

For: DYNAMIC MODIFICATION OF CLUSTER COMMUNICATION PARAMETERS IN CLUSTERED COMPUTER SYSTEM

Cincinnati, Ohio — January 7, 2005

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF (PATENT APPLICATION-37 CFR 41.37)

1. Transmitted herewith is the APPEAL BRIEF in this application with respect to the Notice of Appeal filed on September 7, 2004.

2. **STATUS OF APPLICANT**

This application is on behalf of

XX **other than a small entity**

____ small entity

___ small entity status is requested

___ small entity status was previously requested and is still proper

3. **FEE FOR FILING APPEAL BRIEF**

Pursuant to 37 CFR 1.17(f) the fee for filing the Appeal Brief is:

___	Small entity	$250.00
XX	**Other than a small entity**	**$500.00**

4. **EXTENSION OF TIME**

Applicant petitions for an extension of time under 37 C.F.R. 1.136(a) for the total number of months checked below:

Months		Fee for other than small entity	Fee for small entity
_____	one month	$ 120.00	$ 60.00
XX	**two months**	..... **450.00**	..... 225.00
_____	three months	.... 1,020.00	..... 510.00
_____	four months	..... 1,590.00	..... 795.00
_____	five months	..... 2,160.00	..... 1,080.00

Fee: $ 450.00

If an additional extension of time is required, please consider this a petition therefor.

5. **TOTAL FEE DUE**

The total fee due is:

Appeal brief fee $500.00

Extension fee $450.00

6. **FEE PAYMENT**

____ Attached is a check in the sum of $_____

XX Charge fees totaling $950.00 to Deposit Account No. 23-3000.

7. **FEE DEFICIENCY**

XX Charge any additional extension fee required or credit any overpayment to Deposit Account No. 23-3000.

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Attorney Docket No. IBM/167
Confirmation No. 8940

PATENT

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte Timothy Roy Block and Kiswanto Thayib

Appeal No. _____
Application No. 09/694,586

APPEAL BRIEF

PATENT

Attorney Docket No. IBM/167
Confirmation No. 8940

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Timothy R. Block et al.	Art Unit:	2155
Serial No.:	09/694,586	Examiner:	Benjamin R. Bruckart
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P.O. Box 1450
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APPEAL BRIEF

I. REAL PARTY IN INTEREST

This application is assigned to International Business Machines Corporation, of Armonk, New York.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-31 are pending in the Application. All pending claims stand rejected, and are now on appeal.

IV. STATUS OF AMENDMENTS

No amendments have been filed prior to or subsequent to final rejection (Paper No. 4).

V. SUMMARY OF CLAIMED SUBJECT MATTER

Applicants' invention is generally directed to a method of dynamically modifying a cluster communication parameter used in connection with communicating data between nodes in a clustered computer system.

Clustered computer systems rely on multiple individual computers, or nodes, which are networked together to present a single system image. Moreover, clusters are typically used in highly available/fault tolerant applications where system availability is of paramount concern. (Application, p. 1). Within such systems, it may be desirable in many circumstances to modify certain low-level communication parameters used in the communication of messages between nodes. Due to the desirability of maintaining system availability, as well as the need to coordinate the operation of all of the nodes in a cluster, changing such parameters presents a specific problem that is somewhat unique to clustering.

Specifically, separate copies of a communication parameters are typically maintained on each node in a cluster, thus requiring each copy of a particular communication parameter to be modified on each node whenever a modification to the parameter needs to be made. Furthermore, in many instances, reliable operation of a cluster requires that all copies of a given parameter be consistent with one another at all times. Otherwise, one node may operate in one manner on the assumption that the parameter is set to one value, while another node may operate in an entirely different manner on the assumption that the parameter is set to another value.

Traditionally, the only way that it could be ensured that all copies of a given parameter were modified in a coherent fashion was to take every node off-line, manually change the local copy of the communication parameter on each node, and then restart each node. Doing so, however, often required that not only individual nodes, but the entire cluster, be inactive for at least some period of time. In many high availability applications, however, it is desirable for there to be absolutely no system downtime if at all possible. As a result, a cluster communication parameter change implemented in such a fashion is antipathetic to the goal of providing continuous availability in a clustered computer system. (Application, pp. 3-4).

Embodiments consistent with the invention address this problem by providing a method for dynamically modifying a cluster communication parameter via a distributed protocol whereby individual nodes locally confirm initiation and status information for every node participating in a parameter modification operation. (Application, p. 5). By doing so, individual nodes are also able to locally determine the need to undo locally-performed parameter modifications should any other node be incapable of performing a parameter modification.

As discussed, for example, at pages 3 and 4 of the Application, cluster communication parameters are typically low-level communication parameters that control how each node operates in a clustered computer system. Put another way, these communication parameters typically define the protocol that a node uses to communicate with other nodes and/or the format of the messages being communicated between such nodes.

Various examples of cluster communication parameters are set forth at page 12, line 30 to page 13, line 11, of the Application, including, for example, "heartbeat parameters used to confirm the liveliness of interconnections between nodes in a cluster, e.g., heartbeat message time out, heartbeat acknowledgment message time out, heartbeat frequency or interval, heartbeat failure threshold, heartbeat acknowledgment failure threshold, receive/send timer ratio, etc." In addition, several other types of communication parameters are identified, including, for example, "maximum fragment sizes, message retry timer value, maximum message retry time, send queue overflow threshold, message send window size, etc."

With respect in particular to cluster communication parameters such as heartbeat parameters, certain embodiments enable such parameters to be dynamically modified by configuring a sending node to send a heartbeat message to a receiving node, with the heartbeat message indicating that a heartbeat parameter is to be modified. In response to the heartbeat message, the receiving node may then send an acknowledgment message to the sending node that indicates whether the heartbeat parameter has been modified in the receiving node. Further, modification of the heartbeat parameter in the sending node may be deferred until the acknowledgment message from the receiving node indicates that the heartbeat parameter has been modified in the receiving node. (Application, pp. 5-6).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-31 stand rejected under 35 U.S.C. § 102(a) as being anticipated by U.S. Patent No. 6,108,699 to Moiin (hereinafter *Moiin*).

VII. ARGUMENT

Applicants respectfully submit that the Examiner's rejections of claims 1-31 are not supported on the record, and should be reversed.

A. Claims 1-31 were improperly rejected as being anticipated by *Moiin*.

The Examiner argues that *Moiin* anticipates all of claims 1-31. Anticipation of a claim under 35 U.S.C. §102, however, requires that "each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros., Inc. v. Union Oil Co., 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), *quoted in* In re Robertson, 49 USPQ2d 1949, 1950 (Fed. Cir. 1999). Absent express description, anticipation under inherency requires extrinsic evidence that makes it clear that "the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Continental Can Co. v. Monsanto Co., 20 USPQ2d 1746, 1749 (Fed. Cir. 1991), *quoted in* In re Robertson at 1951. "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." Continental Can at 1749, *quoted in* In re Robertson at 1951.

Applicants respectfully submit that *Moiin* does not disclose the various features recited in claims 1-31, and as such, the rejections thereof should be reversed. Applicants will hereinafter address the various claims that are the subject of the Examiner's rejection in order.

Claim 1

Turning first to independent claim 1, this claim recites a method of dynamically modifying a cluster communication parameter in a clustered computer system. The method includes initiating a cluster communication parameter modification by transmitting a message to

a plurality of nodes in the clustered computer system, locally confirming, within each node, receipt of the message by each of the plurality of nodes, in response to confirming receipt of the message by each of the plurality of nodes, invoking a local cluster communication parameter modification operation on each node, transmitting from each node a status of the local cluster communication parameter modification invoked on that node, locally detecting, within each node, an unsuccessful status for the local cluster communication parameter modification on any node, and in response to detecting an unsuccessful status for any node, locally undoing, in each node for which the local cluster communication operation was performed, the local cluster communication parameter modification operation performed on that node.

Of note, therefore, claim 1 is specifically focused upon a method of dynamically modifying a cluster communication parameter. Furthermore, it should be noted that the various steps in the claimed method involve a cluster communication parameter modification.

Applicants respectfully submit that *Moiin* does not disclose this combination of features, and as such, the Examiner has failed to meet the burden required to sustain a rejection under 35 U.S.C. §102(a).

Moiin, in particular, discloses at the most the modification of a parameter associated with cluster membership, which is appreciated by one of ordinary skill in the art as being a distinctly different concept from a cluster communication parameter within the scope of claim 1. As discussed, for example, at pages 4 and 5 of the Application, cluster communication parameters are typically low-level communication parameters that control how each node operates in a clustered computer system. Put another way, these communication parameters typically define the protocol that a node uses to communicate with other nodes and/or the format of the messages being communicated between such nodes.

Various examples of cluster communication parameters are set forth at page 12, line 30 to page 13, line 11, of the Application, including, for example, "heartbeat parameters used to confirm the liveliness of interconnections between nodes in a cluster, e.g., heartbeat message time out, heartbeat acknowledgment message time out, heartbeat frequency or interval, heartbeat failure threshold, heartbeat acknowledgment failure threshold, receive/send timer ratio, etc." In

addition, several other types of communication parameters are identified, including, for example, "maximum fragment sizes, message retry timer value, maximum message retry time, send queue overflow threshold, message send window size, etc."

Of note, all of these examples of cluster communication parameters address operational characteristics of a clustered computer system that are of a substantially different nature from cluster membership. None of these exemplary communication parameters control *which* nodes in a clustered computer system transmit or receive messages, or any other concept related to cluster membership.

Applicants respectfully submit that *Moiin* does not disclose the dynamic modification of any clustering-related parameter that can be analogized to a "cluster communication parameter" consistent with the invention. Specifically, *Moiin* discloses, at the most, the concept of a "reconfigure message" (*see, e.g.,* col. 2), which is merely used to add or remove nodes to or from a cluster. In connection with the processing of such messages, parameters are interchanged including a cluster size N and a cluster list or vector V, with the former parameter simply storing the number of nodes identified in node list V. (col. 5, lines 32-46). Beyond this, however, the reference is entirely silent with respect to the particular messaging protocols utilized to manage node membership.

Neither the cluster size, nor the cluster list or vector, associated with the reconfigure messages of *Moiin* corresponds to a "cluster communication parameter" within the context of claim 1. Both disclosed parameters in *Moiin* relate to cluster membership (which arguably discloses *which* nodes participate in communications); however, neither relates to *how* such communications occur between nodes. Indeed, the remainder of *Moiin* is entirely silent with respect to the particular protocols used to communicate between nodes, other than the fact that the nodes are interconnected by a conventional ethernet network. (col. 5, lines 14-18).

Given that neither a cluster size nor a cluster list corresponds to a "cluster communication parameter", Applicants respectfully submit that *Moiin* cannot be read to anticipate claim 1.

In rebuttal, the Examiner makes three principal arguments in the Final Office Action dated June 7, 2004. First, the Examiner argues that the concept of a "cluster communication

parameter" is found in the preamble, and thus is not entitled to patentable weight. However, even the case cited by the Examiner in support notes that the preamble is entitled to weight when the body of the claim depends on the preamble for completeness. In claim 1, several steps recite a "cluster communication parameter modification" operation performed on each node, and as such, the Examiner cannot simply ignore the nature of the parameters at issue in the claim as being "communication" parameters.

Second, the Examiner argues that *Moiin* teaches modifying a cluster communication parameter by virtue of modifying cluster membership. Presumably, the Examiner's argument is founded upon the fact that if cluster membership changes, the "parameters of communication" are also changed or modified, i.e., the communications change de facto because different membership presumes a different set of nodes transmit and receive messages. However, the fact that which nodes communicate in a cluster happens to change as a result of a change in membership does not turn a membership-related parameter into a communication parameter.

Furthermore, the concept of "membership" has a unique connotation in the clustering art, and is considered by those of ordinary skill in the art to be an entirely different concept from communication. Rather, membership is more related to the organization of logical entities (nodes) in a cluster, rather than the underlying protocol of how those nodes communicate with one another.

Third, the Examiner argues that Applicants are reading the specification into the claim. However, Applicants have cited the specification only for the purpose of interpreting the term "cluster communication parameter." Applicants have chosen to define the term in such a manner that one of ordinary skill in the art would recognize is entirely separate from the concept of membership, and to this extent, the citations to the specification are relevant in this regard.

Therefore, Applicants respectfully submit that the Examiner's rejection of claim 1 should be reversed. Moreover, given that *Moiin* has no appreciation for the dynamic modification of communication parameters in a clustering environment, Applicants respectfully submit that claim 1 is non-obvious over *Moiin* as well.

Moiin simply does not appreciate any of the problems associated with modifying cluster communication parameters in an active clustered computer system. *Moiin* expects the messaging operations occurring between nodes to occur in an orderly manner, but there is absolutely no disclosure in the reference directed to how one could change any messaging operations through dynamic modifications to communication parameters that control how those messaging operations are performed. Accordingly, Applicants submit that one of ordinary skill in the art would not look to *Moiin* and derive from the disclosure of the reference a method of dynamically modifying a cluster communication parameter.

Indeed, as noted above cluster membership is a completely different concept from cluster communication protocols, presenting entirely different problems requiring substantially different solutions. Among other unique problems, dynamic modifications to cluster communication parameters must be cognizant of the fact that active communications are continually being performed in an active clustering environment, and that the change-over to a new cluster communication parameter must be handled in an orderly fashion and with minimal interruption in messaging traffic. In contrast, changes in cluster membership are rather infrequent events, as even admitted at col. 8, lines 2-5 of *Moiin*, so the concern with interruptions in messaging capability are simply not present for changes to membership-related parameters.

Applicants therefore submit that claim 1 is also non-obvious over *Moiin*. Passage of claim 1 to allowance is therefore also respectfully requested.

Claim 2

Next, with respect to claim 2, this claim depends from claim 1, and specifies that the cluster communication parameter comprises a heartbeat parameter. In rejecting claim 2, the Examiner relies on col. 14, lines 26-34 of *Moiin*. However, this passage merely describes the use of heartbeat messages. There is no disclosure in the reference of making any changes to any parameter associated with such heartbeat messages. Indeed, given that the dynamic changes being made in the various routines disclosed in *Moiin* are all directed to changes in membership,

Applicants respectfully submit that these routines do not disclose or suggest any dynamic modifications to a heartbeat parameter.

The Examiner apparently argues in the Final Office Action dated June 7, 2004 that simply changing the membership of a cluster constitutes a change in a heartbeat parameter, since a change in membership would result in a different set of nodes sending and receiving heartbeat messages. Applicants respectfully submit, however, that just because a change in some parameter that is unrelated to heartbeat messages happens to result in a change to how many heartbeat messages are sent and received does not turn that parameter into a "heartbeat parameter." Computers, particularly clustered computers, are complex systems, and a change to one aspect of a system very frequently results in indirect changes throughout the system. Applicants submit that the indirect affect that a change in membership has on how many heartbeat messages are sent is insufficient to establish that *Moiin* discloses the dynamic change to a "heartbeat parameter" as required by claim 2.

Applicants therefore respectfully submit that claim 2 is novel over *Moiin*, and that the rejection of claim 2 should be reversed. Moreover, Applicants respectfully submit that the Examiner has failed to establish any motivation to modify *Moiin* to dynamically change communication parameters such as heartbeat parameters, as noted above in connection with claim 1. Passage of claim 2 to allowance is therefore also respectfully requested.

Claim 3

Next, with respect to claim 3, this claim depends from claim 1, and specifies that the cluster communication parameter is selected from a group consisting of:

> heartbeat message time out, heartbeat acknowledgment message time out, heartbeat frequency or interval, heartbeat failure threshold, heartbeat acknowledgment failure threshold, receive/send timer ratio, maximum fragment size, message retry timer value, maximum message retry time, send queue overflow threshold, message send window size, and combinations thereof.

As noted above in connection with claim 2, *Moiin*'s disclosure of heartbeat messages falls far short of disclosing the dynamic modification of heartbeat or other communication-related parameters. Each enumerated item recited in claim 3 is an example of a communication-related parameter, and the disclosure of membership modifications in *Moiin* is insufficient to anticipate the concept of dynamically modifying any of these enumerated items, as noted above in connection with claim 1.

Furthermore, the Examiner apparently argues in the Final Office Action that a change in membership would result in a change in a heartbeat or other enumerated parameter. However, Applicants can find no support in *Moiin* for this assertion. To establish anticipation of claim 3, the Examiner would be required, in the least, to establish that *Moiin* teaches specifically changing one of the enumerated parameters. The Examiner has failed to do so in this case.

In addition, the Examiner's argument that a change in membership somehow has an indirect influence on communication-related parameters in connection with the other rejected claims in effect supports the novelty of claim 3. It is only because the Examiner can find no specific communication-related parameters that are changed in *Moiin* that the Examiner has to rely on the indirect effect of a membership change to support the anticipation rejections of these other claims. The Examiner has made no effort to show where in the reference a direct change to one of the enumerated parameters is made in *Moiin*. Indirect effect on a communication-related parameter, however, falls short of disclosing a specific and direct change to that parameter (a "cluster communication parameter modification"), as would be required to anticipate claim 3.

Applicants therefore respectfully submit that claim 3 is novel over *Moiin*, and that the rejection of claim 3 should be reversed. Moreover, Applicants respectfully submit that the Examiner has failed to establish any motivation to modify *Moiin* to dynamically change any of the enumerated communication parameters, and as such, claim 3 is patentable over the prior art of record. Passage of claim 3 to allowance is therefore also respectfully requested.

Claims 4-6

Claims 4-6 are not separately argued.

Claims 7, 12 and 13

Next, with respect to independent claims 7, 12 and 13, each of these claims likewise recites the dynamic modification of a cluster communication parameter. As discussed above in connection with claim 1, *Moiin* merely discloses, at the most, changes to membership-related parameters such as cluster size and a cluster list. Nothing in *Moiin* discloses or suggests the dynamic modification of a parameter used in cluster communications. Accordingly, claims 7, 12 and 13 are all novel over *Moiin* for the same reasons as claim 1. Reversal of the Examiner's rejections of claims 7, 12 and 13 are therefore respectfully requested.

Moreover, the Examiner has failed to establish motivation in the art to modify *Moiin* as would be required to establish obviousness as to any of these claims. Allowance of each of independent claims 7, 12 and 13, and of claims 8-11 and 14-18 which depend therefrom, are therefore respectfully requested.

Claims 8-11 and 14-18

Claims 8-11 and 14-18 are not separately argued.

Claim 19

Next with respect to independent claim 19, this claim generally recites a method of dynamically modifying a heartbeat parameter in a node among a plurality of nodes in a clustered computer system. In addition, among other features, claim 19 specifically recites the concept of sending a heartbeat message from a first node to a second node, where the heartbeat message indicates that a heartbeat parameter is to be modified, as well as the concept that modification of the heartbeat parameter in the first node is deferred until receipt of an acknowledgment message from the second node that indicates that the heartbeat parameter has been modified in the second node.

In rejecting claim 19, the Examiner again relies on *Moiin*, and in particular, the disclosure at col. 14, lines 26-34 which discuss the sending of heartbeat messages. However, as discussed above in connection with claim 2, *Moiin* does not disclose dynamically modifying a heartbeat

parameter. Furthermore, the cited passage of *Moiin* does not disclose the content of a heartbeat message or an acknowledgment thereto, and specifically fails to disclose that a heartbeat message may include an indication that a heartbeat parameter is to be modified, or that an acknowledgment message may include an indication that a heartbeat parameter has been modified, as would be required to anticipate claim 19.

The disclosure related to the reconfiguration messages that the Examiner also cites against claim 19 do not strengthen the Examiner's arguments. Even under the overly-broad readings taken by the Examiner, reconfiguration messages cannot be considered to be "heartbeat messages" as these messages are infrequently communicated messages that initiate changes in membership in a cluster, and have nothing to do with the more regular, periodic heartbeat messages that are conventionally sent out in a cluster. Heartbeat messages are well understood even by *Moiin* to be different from reconfiguration messages, as evidenced by col. 14, lines 29-34 ("For example, keep alive thread 1014, communication timeout thread 1012, and receiver threads 1006 can use kernel timeout interrupts to periodically send and receive *conventional* heartbeat messages to periodically indicate that node 0 is operational and in communication with each of the nodes of the current cluster" (*emphasis added*)).

The Examiner also attempts to argue in the Final Office Action that Applicants arguments are directed merely to language in the preamble. However, the Examiner apparently ignores Applicants arguments focused on the body of the claim, specifically the language "sending a heartbeat message . . . indicating that a heartbeat parameter is to be modified." As Applicants have noted above, this concept (present in the body of the claim, and not in the preamble) is not disclosed in *Moiin*. Indeed, the Examiner completely ignores this language in his response to Applicants' arguments in the Final Office Action.

Applicants therefore respectfully submit that claim 19 is novel over *Moiin*, and that the rejection of claim 19 should be reversed. Moreover, Applicants respectfully submit that the Examiner has failed to establish any motivation to modify *Moiin* to provide, within a heartbeat message, an indication that a heartbeat parameter is to be modified. As a result, claim 19 is also

non-obvious over *Moiin*. Allowance of claim 19, as well as of claims 20-25 which depend therefrom, is therefore respectfully requested.

Claims 20 and 27

Claim 20 depends from claim 19, and additionally recites the concept of determining whether modifying the heartbeat parameter on a first node requires synchronization with a second node. Claim 27 is similar to claim 20, but depends from claim 26. As discussed, for example, at p. 19, lines 8-24 of the Application, changes to some heartbeat parameters may not need to be synchronized between nodes in a cluster, and as a result, claims 20 and 26 describe functionality that enables synchronization to be avoided for a heartbeat parameter modification that does not require it.

The passages in *Moiin* cited by the Examiner (col. 14, lines 10-15 and 26-34; col. 2, lines 29-37 and Figs. 4-6) do not disclose any functionality that is even arguably analogous to the functionality recited in claims 20 and 27. Accordingly, Applicants submit that the Examiner has failed to meet the burden required to establish anticipation of these claims, and that the rejections of these claims should be reversed.

Claims 21 and 28

Claim 21 depends from claim 20, and additionally recites the concept of determining whether a heartbeat parameter is local or global in nature. Claim 28 is similar to claim 21, but depends from claim 27.

The passages in *Moiin* cited by the Examiner (col. 14, lines 19-21 and col. 5, lines 18-30) do not disclose any functionality that is even arguably analogous to the functionality recited in claims 21 and 28. Accordingly, Applicants submit that the Examiner has failed to meet the burden required to establish anticipation of these claims, and that the rejections of these claims should be reversed.

Claim 22

Claim 22 is not separately argued.

Claims 23-24 and 29-30

Claim 23 depends from claim 22, and recites in part the concept of setting a change request indicator in a heartbeat message to indicate that a heartbeat parameter is to be modified. Claim 24 depends from claim 23 and additionally recites modifying a heartbeat parameter only after receiving a heartbeat acknowledgment message with a set change request indicator. Claims 29 and 30 recite similar subject matter, but depend ultimately from claim 26.

The passages in *Moiin* cited by the Examiner with reference to change request indicators (col. 6, lines 35-42 and col. 7, lines 31-61) do not disclose any functionality that is even arguably analogous to the functionality recited in these claims. Apparently, the Examiner considers the indications of prospective cluster sizes in reconfiguration messages to correspond to change request indicators; however, the indications of cluster size fall short of anticipating the concept of a change request indicator.

First, these indicators are provided in heartbeat messages in the rejected claims. The cluster sizes in *Moiin* are communicated in reconfiguration messages, which as noted above, are recognized by *Moiin* as being different from heartbeat messages.

Second, the fact that the size of a prospective cluster is communicated in a message may indicate to a node that the membership is changing is insufficient to teach a specific change request indicator in a message. Indeed, it is only after a node compares its local information with the cluster size communicated by another node that the node can ascertain whether a change is occurring. The cluster size, itself, therefore fails to serve as an indicator of a change request.

Accordingly, Applicants submit that the Examiner has failed to meet the burden required to establish anticipation of these claims, and that the rejections thereof should be reversed.

Claim 25

Claim 25 is not separately argued.

Claims 26 and 31

Next turning to independent claims 26 and 31, each of these claims likewise recites the dynamic modification of a heartbeat parameter through the use of heartbeat messages that indicate that a heartbeat parameter is to be modified and acknowledgment messages that indicate that a heartbeat parameter has been modified. As discussed above in connection with claim 19, these features are not disclosed by *Moiin*, and as such, these claims are novel over *Moiin* for the same reasons as presented above for claim 19. The Examiner's rejections of these claims should therefore be reversed. Moreover, Applicants respectfully submit that the Examiner has failed to establish any motivation to modify *Moiin* to provide, within a heartbeat message, an indication that a heartbeat parameter is to be modified. As a result, claims 26 and 31 are also non-obvious over *Moiin*. Allowance of claims 26 and 31, as well as of claims 27-30 which depend therefrom, is therefore respectfully requested.

IX. CONCLUSION

In conclusion, Applicants respectfully request that the Board reverse the Examiner's rejections of claims 1-31, and that the Application be passed to issue. If there are any questions regarding the foregoing, please contact the undersigned at 513/241-2324. Moreover, if any other charges or credits are necessary to complete this communication, please apply them to Deposit Account 23-3000.

Respectfully submitted,

WOOD, HERRON & EVANS, L.L.P.

Date: 7 JAN 2005

By: _____

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X. CLAIMS APPENDIX: CLAIMS ON APPEAL (S/N 09/694,586)

1. (Original) A method of dynamically modifying a cluster communication parameter in a clustered computer system, the method comprising:

(a) initiating a cluster communication parameter modification by transmitting a message to a plurality of nodes in the clustered computer system;

(b) locally confirming, within each node, receipt of the message by each of the plurality of nodes;

(c) in response to confirming receipt of the message by each of the plurality of nodes, invoking a local cluster communication parameter modification operation on each node;

(d) transmitting from each node a status of the local cluster communication parameter modification invoked on that node;

(e) locally detecting, within each node, an unsuccessful status for the local cluster communication parameter modification on any node; and

(f) in response to detecting an unsuccessful status for any node, locally undoing, in each node for which the local cluster communication operation was performed, the local cluster communication parameter modification operation performed on that node.

2. (Original) The method of claim 1, wherein the cluster communication parameter comprises a heartbeat parameter.

3. (Original) The method of claim 1, wherein the cluster communication parameter is selected from the group consisting of heartbeat message time out, heartbeat acknowledgment message time out, heartbeat frequency or interval, heartbeat failure threshold, heartbeat acknowledgment failure threshold, receive/send timer ratio, maximum fragment size, message retry timer value, maximum message retry time, send queue overflow threshold, message send window size, and combinations thereof.

4. (Original) The method of claim 1, wherein locally confirming receipt of the message by each of the plurality of nodes includes participating in an ACK round responsive to receipt of the message.

5. (Original) The method of claim 1, wherein transmitting from each node a status of the local cluster communication parameter modification invoked on that node is performed during an ACK round performed subsequent to invoking the local cluster communication parameter modification operation.

6. (Original) The method of claim 1, wherein transmitting the message, confirming receipt of the message, and transmitting the status are performed via multicast messages.

7. (Original) An apparatus, comprising:

(a) a memory; and

(b) a program resident in the memory, the program configured to dynamically modify a cluster communication parameter on a local node among a plurality of nodes in a clustered computer system, the program configured to locally confirm, for the local node, successful receipt of an initiation message by each of the plurality of nodes, and a status for a local cluster communication parameter modification operation performed by each of the plurality of nodes, the program further configured to undo a local cluster communication parameter modification operation performed on the local node in response to detection of an unsuccessful status for a local cluster communication parameter modification on any node.

8. (Original) The apparatus of claim 7, wherein the program is further configured to locally confirm receipt of an initiating message by each of the plurality of nodes.

9. (Original) The apparatus of claim 8, wherein the program is configured to locally confirm receipt of the initiating message by each of the plurality of nodes by participating in an ACK round responsive to receipt of the message.

10. (Original) The apparatus of claim 7, wherein the program is further configured to transmit from the local node a status of the local cluster communication parameter modification operation.

11. (Original) The apparatus of claim 10, wherein the program is configured to transmit the status during an ACK round performed subsequent to invocation of the local cluster communication parameter modification operation.

12. (Original) A clustered computer system, comprising:

(a) a plurality of nodes coupled to one another over a network; and

(b) a plurality of programs, each local to a node among the plurality of nodes, each program configured to dynamically modify a cluster communication parameter on its respective local node, each program further configured to locally confirm, for its respective local node, successful receipt of an initiation message by each of the plurality of nodes, and a status for a local cluster communication parameter modification operation performed by each of the plurality of nodes, and each program further configured to undo a local cluster communication parameter modification operation performed on its respective local node in response to detection of an unsuccessful status for a local cluster communication parameter modification on any node.

13. (Original) A program product, comprising:

(a) a program configured to dynamically modify a cluster communication parameter on a local node among a plurality of nodes in a clustered computer system, the program configured to locally confirm, for the local node, successful receipt of an initiation message by each of the plurality of nodes, and a status for a local cluster communication parameter modification operation performed by each of the plurality of nodes, the program further configured to undo a local cluster communication parameter modification operation performed on the local node in response to detection of an unsuccessful status for a local cluster communication parameter modification on any node; and

(b) a signal bearing medium bearing the program.

14. (Original) The program product of claim 13, wherein the signal bearing medium includes at least one of a transmission medium and a recordable medium.

15. (Original) The program product of claim 13, wherein the program is further configured to locally confirm receipt of an initiating message by each of the plurality of nodes.

16. (Original) The program product of claim 15, wherein the program is configured to locally confirm receipt of the initiating message by each of the plurality of nodes by participating in an ACK round responsive to receipt of the message.

17. (Original) The program product of claim 13, wherein the program is further configured to transmit from the local node a status of the local cluster communication parameter modification operation.

18. (Original) The program product of claim 17, wherein the program is configured to transmit the status during an ACK round performed subsequent to invocation of the local cluster communication parameter modification operation.

19. (Original) A method of dynamically modifying a heartbeat parameter in a node among a plurality of nodes in a clustered computer system, the plurality of nodes including first and second nodes, the first node configured to send a heartbeat message to the second node, and the second node configured to send an acknowledgment message to the first node in response to receiving the heartbeat message, the method comprising:

(a) sending a heartbeat message from the first node to the second node, the heartbeat message indicating that a heartbeat parameter is to be modified; and

(b) deferring modification of the heartbeat parameter in the first node until receipt of an acknowledgment message sent from the second node to the first node that indicates that the heartbeat parameter has been modified in the second node.

20. (Original) The method of claim 19, further comprising determining whether modifying the heartbeat parameter on the first node requires synchronization with the second node.

21. (Original) The method of claim 20, wherein determining whether modifying the heartbeat parameter on the first node requires synchronization with the second node further comprises determining whether the heartbeat parameter is local or global in nature.

22. (Original) The method of claim 19, further comprising, in response to receiving the heartbeat message with the second node, sending an acknowledgment message from the second node to the first node, the acknowledgment message indicating whether the heartbeat parameter has been modified in the second node.

23. (Original) The method of claim 22, wherein each of sending the heartbeat message and sending the heartbeat acknowledgment message includes accessing a heartbeat message record that includes a change request indicator, the method further comprising:

(a) prior to sending the heartbeat message that indicates that the heartbeat parameter is to be modified, setting the change request indicator in the heartbeat message record; and

(b) prior to sending the heartbeat acknowledgment message that indicates whether the heartbeat parameter has been modified in the second node, selectively setting or clearing the change request indicator in the heartbeat message record.

24. (Original) The method of claim 23, wherein deferring modification of the heartbeat parameter in the first node until the acknowledgment message indicates that the heartbeat parameter has been modified in the second node includes modifying the heartbeat parameter in the first node only after receiving a heartbeat acknowledgment message with a set change request indicator.

25. (Original) The method of claim 19, further comprising:

(a) modifying the heartbeat parameter in the second node; and

(b) modifying the heartbeat parameter in the first node after receipt of an acknowledgment message sent from the second node to the first node that indicates that the heartbeat parameter has been modified in the second node.

26. (Original) An apparatus, comprising:

(a) a memory; and

(b) a program resident in the memory and configured to dynamically modify a heartbeat parameter in a first node among a plurality of nodes in a clustered computer system by sending a heartbeat message to a second node among the plurality of nodes that indicates that the heartbeat parameter is to be modified and thereafter deferring modification of the heartbeat parameter in the first node only after receiving an acknowledgment message from the second node indicating that the heartbeat parameter has been modified in the second node.

27. (Original) The apparatus of claim 26, wherein the program is further configured to determine whether modifying the heartbeat parameter on the first node requires synchronization with the second node.

28. (Original) The apparatus of claim 27, wherein the program is configured to determine whether modifying the heartbeat parameter on the first node requires synchronization with the second node by determining whether the heartbeat parameter is local or global in nature.

29. (Original) The apparatus of claim 26, wherein the program is configured to send the heartbeat message by accessing a heartbeat message record that includes a change request indicator, and wherein the program is further configured to set the change request indicator in the heartbeat message record prior to sending the heartbeat message that indicates that the heartbeat parameter is to be modified.

30. (Original) The apparatus of claim 29, wherein the program is configured to defer modification of the heartbeat parameter in the first node until the acknowledgment message indicates that the heartbeat parameter has been modified in the second node by modifying the heartbeat parameter in the first node only after receiving a heartbeat acknowledgment message with a set change request indicator.

31. (Original) A program product, comprising:

(a) a program configured to dynamically modify a heartbeat parameter in a first node among a plurality of nodes in a clustered computer system by sending a heartbeat message to a second node among the plurality of nodes that indicates that the heartbeat parameter is to be modified and thereafter deferring modification of the heartbeat parameter in the first node only after receiving an acknowledgment message from the second node indicating that the heartbeat parameter has been modified in the second node; and

(b) a signal bearing medium bearing the program.